through want of time or the requisite ability, to extend their reading into the more recondite parts discussed by the above-named writers. As a proof that Mr. Aldis's labours have been appreciated, we need only say that this edition, improved by the addition of hints for the solution of some of the examples, is the third.

Familiar Wild Flowers: Figured and described by F. Edward Hulme. 2nd Series. With Coloured Plates. (London: Cassell, Petter, Galpin, and Co.)

WE have already called attention to the appearance of the first volume of this series, and of the second we can speak in equally favourable terms. In selecting for illustration a hundred of our familiar wild flowers, all chosen in some way for their beauty, a certain amount of arbitrariness must be allowed; but in the present instance very little complaint will be made on this head by the majority of readers. The coloured lithographs are somewhat unequal in excellence, but, as a rule, are extremely good. The book is one well adapted to awaken or to foster in young people a love of the floral beauties of our fields and hedges, woods and ditches.

A New and Easy Method of Studying British Wild Flowers by Natural Analysis. By Frederick A. Messer. (London: D. Bogue, 1880.)

THIS work indicates a very large amount of labour on the part of the author; whether the labour has been altogether well applied is another question. For the field botanist whose sole object is to determine the name of a wild flower it will no doubt be useful in assisting him to make out at least the order and genus, for beyond this it does not pretend to go. No botanist will be disposed to depreciate the value of field botany and of the study of critical species, which often leads to further study of some of the great questions connected with the life of plants. There is no doubt that species-botany had been exalted a quarter of a century ago to a far too prominent place by English workers, and had been much too exclusively followed, to the disregard of morphological and especially of physiological work. The inevitable reaction has set in, and is now perhaps at its height, when the number of botanists who have an accurate acquaintance with our British flora is extremely small. As an introductory work for those who are desirous of increasing this number, Mr. Messer's book may be recommended, always provided that the student does not imagine that it will materially help him in his study of the structural and genetic affinities of the different families of plants. The graphic illustrations are novel in design, and will no doubt help to impress the meaning of the technical terms on the beginner. Some few errors should not have been allowed to pass in a work bearing the date of the present year. Among these is the reference of *Selaginella selaginoides* to the genus *Lycopodium*, and the complete suppression of Selaginellaceæ as a British order of vascular cryptogams.

Manual of the Indigenous Grasses of New Zealand. By John Buchanan, F.L.S. (Wellington: James Hughes, 1880.)

THIS is one of those excellent manuals emanating from the Colonial Museum and Geological Survey Department of New Zealand under the admirable direction of Dr. Hector. The work is a reproduction in a handy form of the folio work ordered by the New Zealand Government in 1876, to be prepared "with nature-printed plates and descriptions of each species, and to be accompanied by an essay on the grasses and forage plants likely to prove useful in New Zealand." This explanation is extracted from the preface of the book before us, which preface has been written by Dr. Hector himself. We also learn from the same source that "the whole of the illustrations of the large edition were drawn from nature by Mr. John Buchanan. . . . The condition imposed—that the plates should be nature printed—rendered it necessary in the first instance to publish the work in folio, but, as this large size is both inconvenient and costly, only a small edition has been issued, and the present handy volume has been printed for more general distribution. The plates now given—sixty-four in number, and including eighty-seven different species and varieties of grasses—are reductions by the process of photo-lithography from the original folio plates, and depict the grasses as of one half the natural size of the original specimens."

There can be no doubt but that the book will be very valuable, not only to the botanist, but also to those who wish to know all about New Zealand grasses for their utility for fodder or for other purposes. The plan adopted in the book is to give under each genus a brief generic description and general distribution over the world, the names of the countries being given in capitals, so that they catch the eye at once; this is followed by the etymology of the generic name. The species are then separately enumerated, the generic and specific names standing first, followed by the common name, reference to the plate, synonyms, habit of the plant, time of flowering, specific description and distribution of the particular species, after which is a good account of the properties and uses of the grass, and a detailed reference to the figures. The book is extremely well printed, the plates are well done, and there are two capital indices, the first to genera and species, and the second to popular names. JOHN R. JACKSON

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Geological Climates

IN NATURE, vol. xxii. p. 200 *et seq.*, there occurs an important statement by Mr. J. Starkie Gardner, to the effect that fossil remains not distinguishable from *Araucaria Cunninghami* had been found among the Eocene plant beds of Bournemouth, in the south of England.

After reading Mr. Gardner's paper, I availed myself of an opportunity of studying the leaflets of the living and dead specimens of this species of *Araucaria* in the Kew Gardens, including the original specimens in the Herbarium named by Mr. Cunningham, and agree with Mr. Gardner as to the difficulty of separating the *A. Cunninghami* from the Sequoias by leaflets alone when in the fossil condition.

Assuming Mr. Gardner's conclusion to be true, viz., that the Eocene Bournemouth tree was identical, or nearly so, with the living *A. Cunninghami*, a question arises as to climate which will prove insoluble to geologists of the school of Lyell and his followers, who assume that all physical causes during geological time have been pretty much the same as at the present time and times immediately preceding the present.

The Moreton Bay Pine (*A. Cunninghami*) is found, as the name imports, on the shores of Moreton Bay, on the east coast of Australia, and has a range of 900 miles, from 14° S. lat. to 29° 30′ S. lat. along that coast. It does not extend more than eighty miles inland, where, instead of being 130 feet in height, which it is on the coast, it becomes a dwarf tree, and farther inland it entirely disappears.

This tree therefore becomes a most delicate self-registering thermometer, indicating to us precisely (after the well-known manner of plants) the exact conditions of the Eocene climate that existed in Bournemouth during the earlier Tertiary period. I propose to examine the evidence given by this thermometer, and to invite my *uniformitarian* friends to explain how this evidence can exist in conformity with their views.

The climate of the northern limit of the Moreton Bay Pine is as follows (as regards heat):—

Mean (January).	Mean (July).	Mean (Annual).
82°·0 F.	71°·0 F.	76°·5 F.

The climate of the southern limit is—

Mean (January).	Mean (July).	Mean (Annual).
$72^{\circ}\cdot5$ F.	$57^{\circ}\cdot5$ F.	$65^{\circ}\cdot0$ F.

The mean of both being—

Mean (January).	Mean (July).	Mean (Annual).
$77^{\circ}\cdot25$ F.	$64^{\circ}\cdot25$ F.	$70^{\circ}\cdot75$ F.

The present mean annual temperature of Bournemouth is only $50^{\circ}\cdot4$ F., which is $20^{\circ}\cdot35$ F. below its mean annual temperature in the Eocene period.

I want to know how Lyell and his followers propose to give to Bournemouth, from present existing forces and causes, this additional 20° F. of heat. If geologists really wish to earn the respect of their fellow-workers in more exact branches of knowledge, they must condescend to consider *quantitative* as well as *qualitative* questions, and enter into numerical details. To enable them to do so I lay down the two following statements:—

1. Of all places now existing on the same parallel of latitude as Bournemouth the highest mean temperature is in 20° W. long. (in the Atlantic), where the temperature is $53^{\circ}\cdot1$ F., or only $2^{\circ}\cdot7$ F. above that of Bournemouth.

Of all places on the same parallel the lowest mean temperature is found at 80° W. long. (on the borders of Labrador and Canada), where it is $29^{\circ}\cdot3$ F., which is $21^{\circ}\cdot1$ F. below that of Bournemouth, and $2^{\circ}\cdot7$ F. below the freezing point of water.

Existing forces and circumstances might therefore benefit Bournemouth to the extent of $2^{\circ}\cdot7$ F. degrees, or might injure it to the extent of $21^{\circ}\cdot1$ F.; but how is Bournemouth to gain the 20° of heat necessary for the flourishing of the *Araucaria Cunninghami* on its Eocene sea-shore swamps, if existing causes only were at work?

2. The place in the northern hemisphere which is now most closely allied in climate to Moreton Bay, or to Bournemouth in Eocene times, is the central part of the Gulf of California, in Western Sub-tropical America.

Again, I ask geologists of the *uniformitarian* school to show me how they propose to convert the climate of Bournemouth into the present climate of the Gulf of California or that of Moreton Bay by mere transposition of land and water, without shifting the position of the earth's axis, which is an inadmissible hypothesis?

Trinity College, Dublin, SAML. HAUGHTON
September 25, 1880

The Naini Tal Landslip

FOR the purpose of making a thorough inquiry into the details of the causes that led to the above lamentable disaster an able geologist would undoubtedly be required, as was suggested in your leader last week. I think, however, that to any one who, like myself, has resided even but temporarily at Naini Tal, the main cause of the recent slip must be sufficiently obvious without the aid of the geologist.

From the account of the particular buildings overwhelmed it is plain that the slip took place close to where an almost equally bad one occurred some years ago (in the winter of 1865, I believe), viz., just above the Victoria Hotel, on the shoulder uniting the two peaks of Cheena and Lyria Kauta.

The foot of this shoulder forms the northern border of the Tal, or lake, for which the station is justly famed; the strata composing it, as far as I can remember, dip *with* the slope of the hill southwards towards the lake. Moreover, it faces the direction from which the rain mostly comes. The conditions for the production of a landslip in the direction of the lake are thus amply fulfilled.

Though landslips are not at all infrequent from this hill (one occurred near Cheena when I was there, killing two natives), it is from its sunny aspect and *comparatively* gentle slope decidedly the favourite, the station being mainly built on its slopes or at its foot.

On the hill which forms the southern border of the lake the dip of the strata is in the opposite direction to the slope of the hill. It is consequently much freer from landslips, and much safer than the former, as only a few chips at most could be detached from it on the side facing the lake, by the action of rain. The nearly constant gloom however in which, from its northern aspect and its steepness combined, it is necessarily shrouded, as well as the lack of building area, naturally tends to limit its population. This hill again on its *southern* side, which faces the plains, repeats the same phenomena as the shoulder before mentioned; an enormous portion of it having become detached towards the plains, and called pre-eminently "The Landslip."

When staying in the Victoria Hotel in May and June, 1877, I always felt it would take very little to bring the whole hill, and especially Government House, which appeared almost vertically above us, down on top of us. The old landslip which I mentioned as being close to the present hotel buried its predecessor, and might be thought to have furnished ample warning against choosing such a dangerous spot upon to which to rear a fresh one.

To guard against such disasters in future I would suggest that all houses in the hill-stations should, if possible, be built mainly where the strata dip in the opposite direction to the slope of the hill, and that where the strata dip in the same direction as the slope of the hill all proximity to steep slopes should be avoided, and only the gentler slopes utilised for building on.

I may add that the rainfall on the present occasion seems to have been phenomenal, if, as the *Times* says, it was thirty-three inches in seventy-two hours. Still, extraordinary and sudden downpours of this kind must be expected, where the summer rainfall has varied from forty inches in 1877 to 117 inches in 1862. E. DOUGLAS ARCHIBALD

Tunbridge Wells, October 2

Branch-cutting Beetles

IT is rather curious that the story which Mr. Ober was told in the Carribbees (NATURE, vol. xxii. p. 216) should be generally believed in Southern Brazil also, viz., that a large beetle "seizes a small branch of a tree between its enormously long nippers, and buzzes round and round the branch till this is cut off." Only in the Antilles this cutting of branches is attributed to a huge Lamellicorn, the *Dynastes hercules*, and in Santa Catharina to a large Longicorn, the *Macrodontia cervicornis*.

Everybody here will tell you this story, but nobody, as far as I know, has ever seen the beetle at work. Branches *are* often cut off by some animal. On a camphor-tree in my garden six branches, from 9·5 to 13·5 centim. in circumference, have been cut off; and on a *Pithecolobium* for some time almost every morning a fresh branch had fallen down, some being even much thicker than those of the camphor-tree. The cutting is always in a plane perpendicular to the axis of the branch, as it would be were it made by a rotating beetle; but in this case an annular incision of equal depth all round the branch would be produced, and this I have never seen. On the contrary, the incision, which causes the branch to break off, consists of two parts, occupying the lower and the upper face of the branch, meeting on one or on either side of it, and being separated by a wedge-shaped interval, which is broken by the weight of the branch, and is narrower or broader according to its toughness.

Once—many years ago—I came to the *Pithecolobium* tree early in the morning, when a branch was just falling down, and with it came down the animal by which it had been amputated. It was a Longicorn beetle, the well-named *Oncideres amputator*, Fabr. I have since seen specimens of some other species of the same genus, which had been caught by others in the act of cutting branches. It is almost unnecessary to add that they do so by gnawing, and not by whirling round the branches.

Blumenau, Santa Catharina, Brazil, FRITZ MÜLLER
August 13

The Tay Bridge Storm

IN NATURE, vol. xxi. p. 468, Mr. Ley asks, relative to my letter on the Tay Bridge storm, which appeared in NATURE, vol. xxi. p. 443, on what evidence I state "that when the velocity of the cyclone centre is very great, the strength of the wind for any gradients is increased, or at all events becomes more squally and gusty."

I much regret the circumstances which have prevented my replying to him sooner, but may now state shortly the three principal pieces of evidence which led me to that conclusion:—

1. My own observation in a large number of cyclones where the velocity of translation was very great, there has been a quality of gustiness or squalliness and intensity generally greater than is usual for the observed gradients.

2. Ever since the barometer was invented it has been known that a rapid fall of the mercury indicates worse weather than a slow one. Now we know that the rate at which this fall takes place at any station depends:—(1) On the steepness of the